# FIG. 1

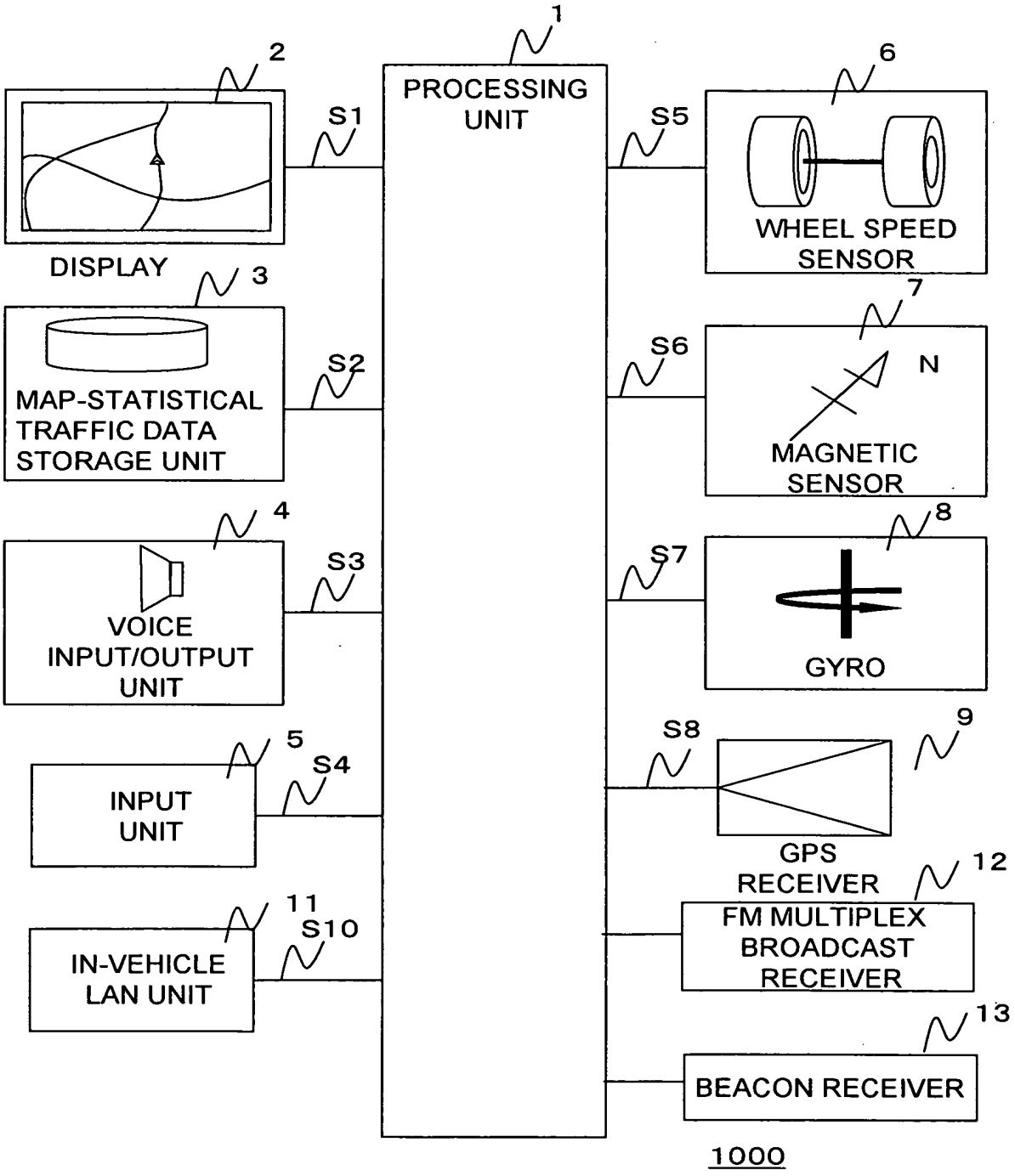

1
PROCESSING UNIT
2
DISPLAY
S1
3
MAP-STATISTICAL TRAFFIC DATA STORAGE UNIT
S2
4
VOICE INPUT/OUTPUT UNIT
S3
5
INPUT UNIT
S4
11
IN-VEHICLE LAN UNIT
S10
S5
6
WHEEL SPEED SENSOR
S6
7
N
MAGNETIC SENSOR
S7
8
GYRO
S8
9
GPS RECEIVER
12
FM MULTIPLEX BROADCAST RECEIVER
13
BEACON RECEIVER
1000

FIG.2

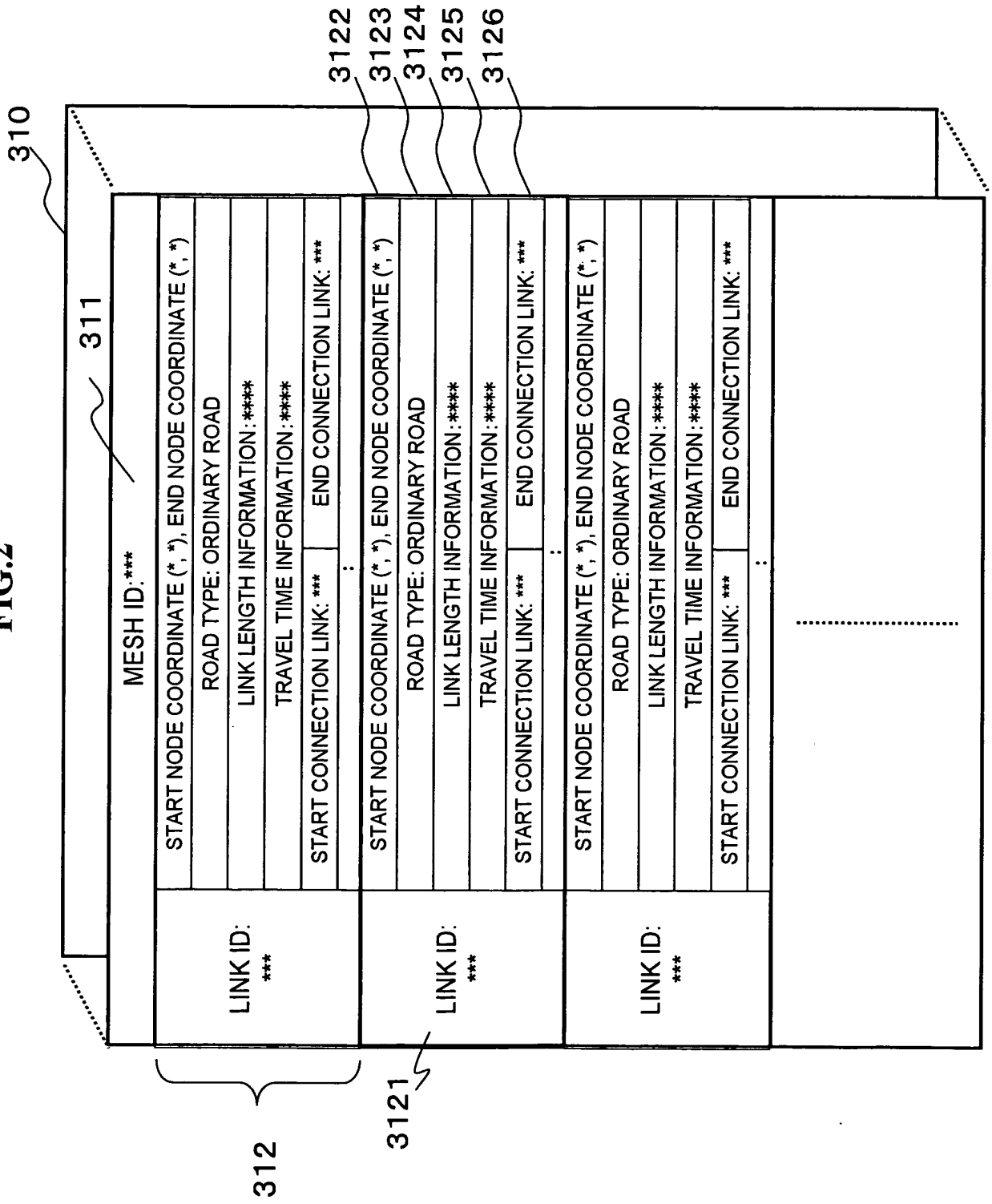
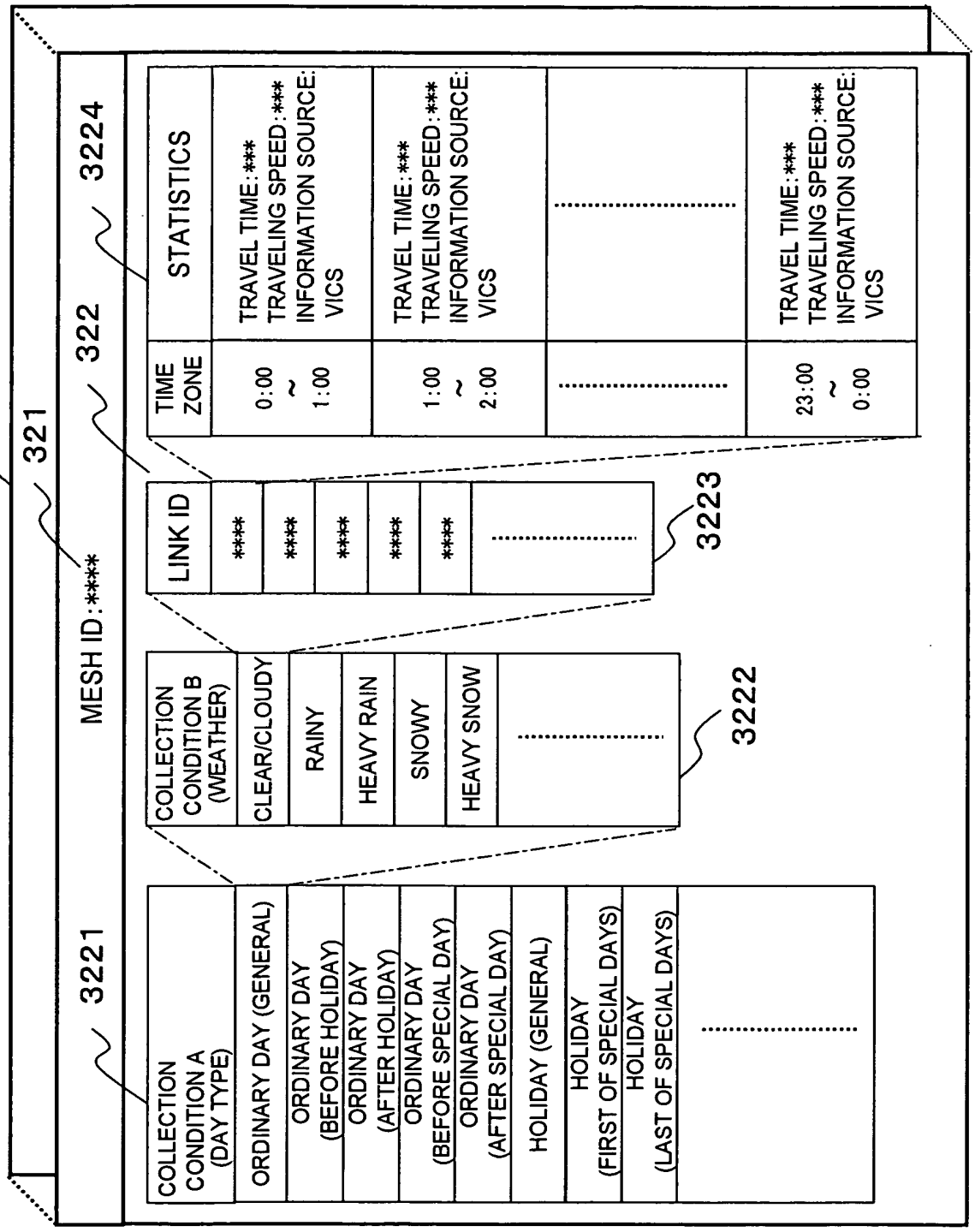

310
311
MESH ID:***
LINK ID: ***
START NODE COORDINATE (*, *), END NODE COORDINATE (*, *)
ROAD TYPE: ORDINARY ROAD
LINK LENGTH INFORMATION:****
TRAVEL TIME INFORMATION:****
START CONNECTION LINK: ***
END CONNECTION LINK: ***
3122
3123
3124
3125
3126
312
3121

FIG. 3

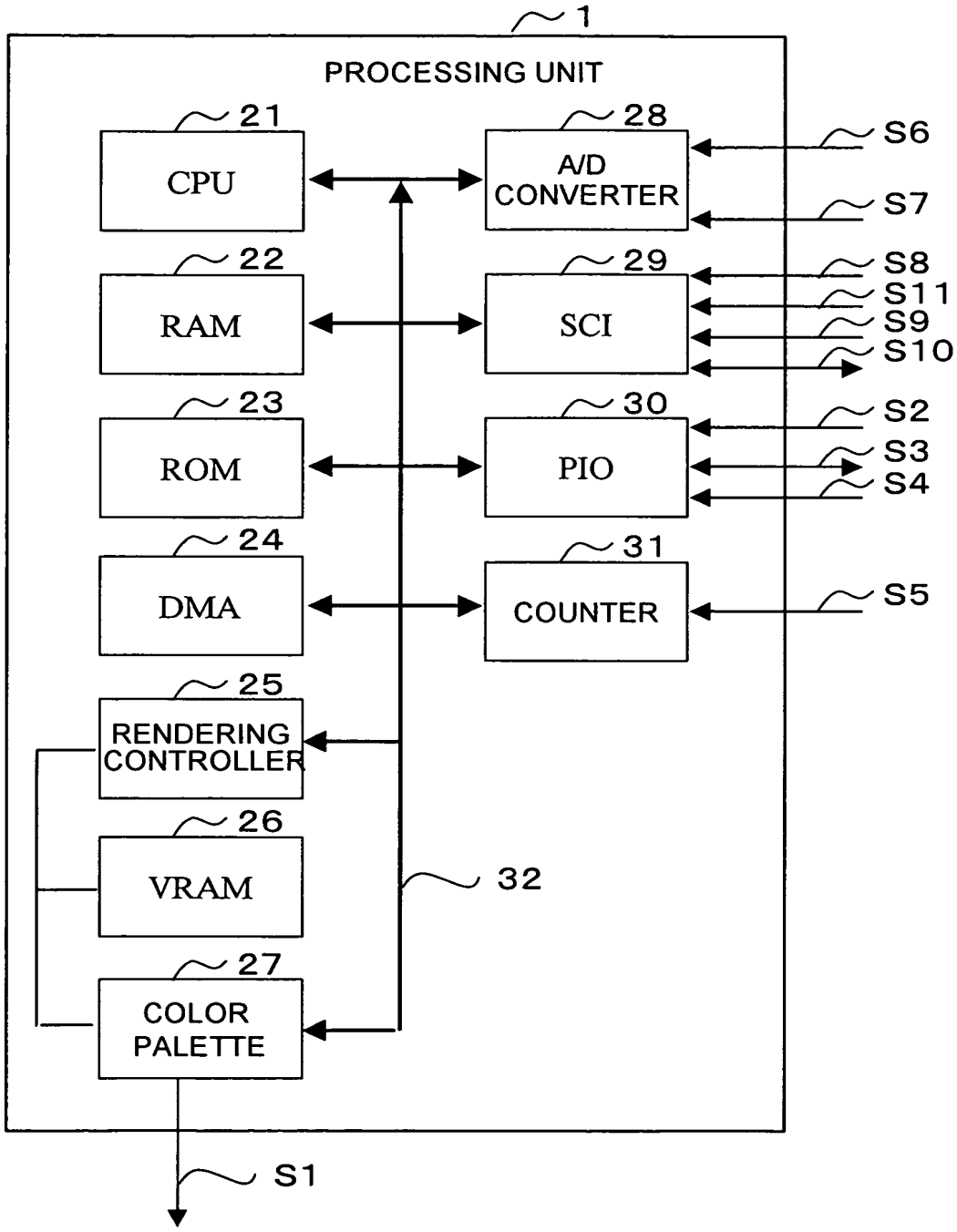

320
321
MESH ID:****
322
3224
3221
COLLECTION CONDITION A (DAY TYPE)
ORDINARY DAY (GENERAL)
ORDINARY DAY (BEFORE HOLIDAY)
ORDINARY DAY (AFTER HOLIDAY)
ORDINARY DAY (BEFORE SPECIAL DAY)
ORDINARY DAY (AFTER SPECIAL DAY)
HOLIDAY (GENERAL)
HOLIDAY (FIRST OF SPECIAL DAYS)
HOLIDAY (LAST OF SPECIAL DAYS)
.....
3222
COLLECTION CONDITION B (WEATHER)
CLEAR/CLOUDY
RAINY
HEAVY RAIN
SNOWY
HEAVY SNOW
.....
3223
LINK ID
****
****
****
****
****
.....
TIME ZONE
0:00 ~ 1:00
1:00 ~ 2:00
.....
23:00 ~ 0:00
STATISTICS
TRAVEL TIME:***
TRAVELING SPEED:***
INFORMATION SOURCE: VICS
TRAVEL TIME:***
TRAVELING SPEED:***
INFORMATION SOURCE: VICS
.....
TRAVEL TIME:***
TRAVELING SPEED:***
INFORMATION SOURCE: VICS

# FIG. 4

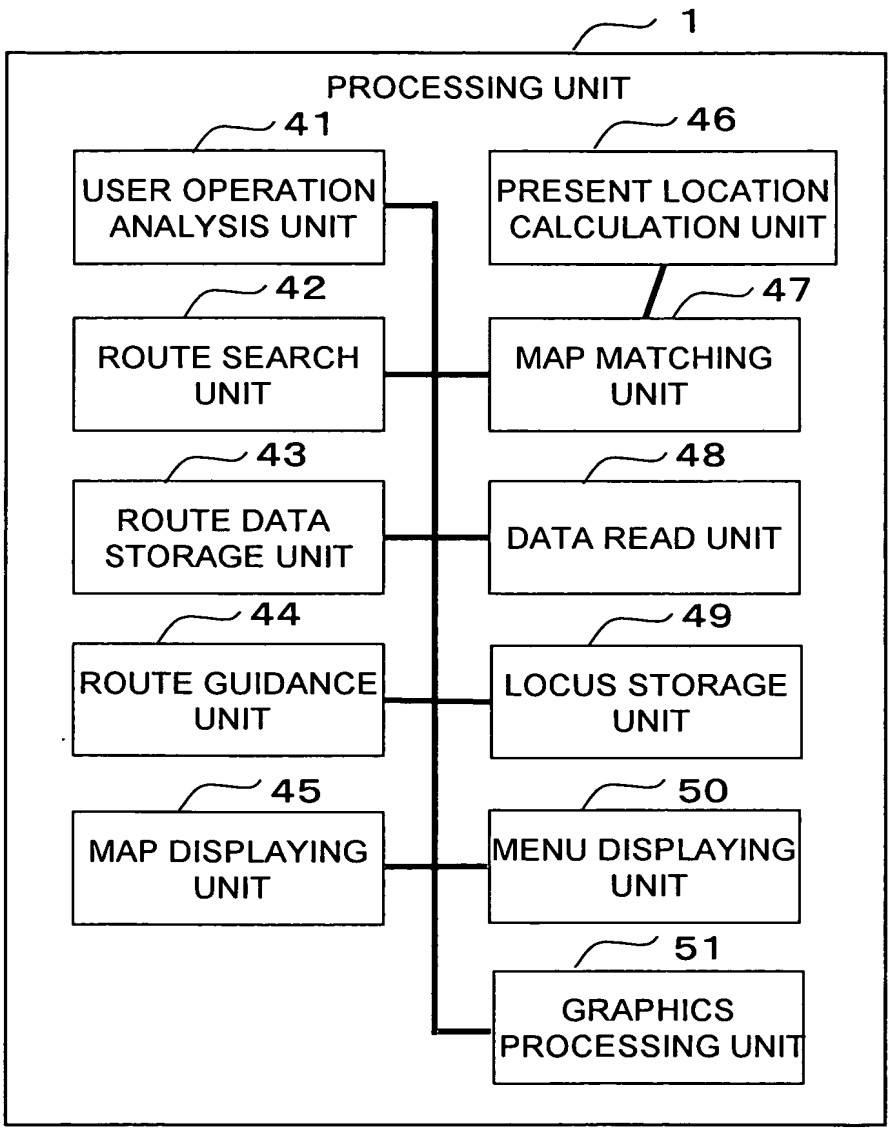
331 332

| DATE | COLLECTION CONDITION A (DAY TYPE) |
|---|---|
| 2002/11/28 | ORDINARY DAY (GENERAL) |
| 2002/11/29 | ORDINARY DAY (BEFORE HOLIDAY) |
| 2002/11/30 | HOLIDAY (GENERAL) |
| 2002/12/01 | HOLIDAY (GENERAL) |
| 2002/12/02 | ORDINARY DAY (AFTER HOLIDAY) |
| 2002/12/03 | ORDINARY DAY (GENERAL) |
| ⋮ | ⋮ |

# FIG. 5


1
PROCESSING UNIT
21
CPU
22
RAM
23
ROM
24
DMA
25
RENDERING CONTROLLER
26
VRAM
27
COLOR PALETTE
28
A/D CONVERTER
29
SCI
30
PIO
31
COUNTER
32
S1
S2
S3
S4
S5
S6
S7
S8
S9
S10
S11

# FIG. 6


1
PROCESSING UNIT
41
USER OPERATION ANALYSIS UNIT
42
ROUTE SEARCH UNIT
43
ROUTE DATA STORAGE UNIT
44
ROUTE GUIDANCE UNIT
45
MAP DISPLAYING UNIT
46
PRESENT LOCATION CALCULATION UNIT
47
MAP MATCHING UNIT
48
DATA READ UNIT
49
LOCUS STORAGE UNIT
50
MENU DISPLAYING UNIT
51
GRAPHICS PROCESSING UNIT

# FIG. 7

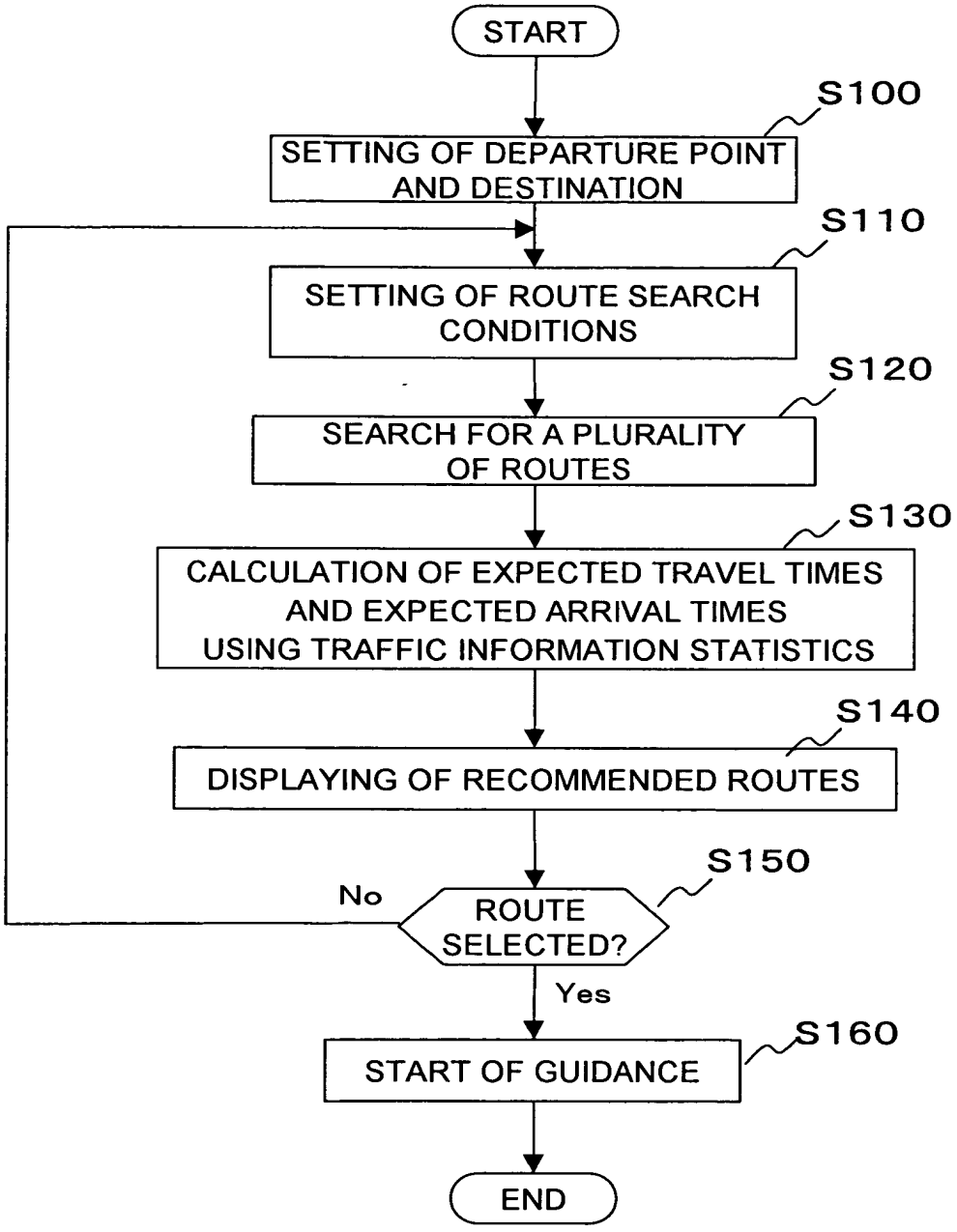
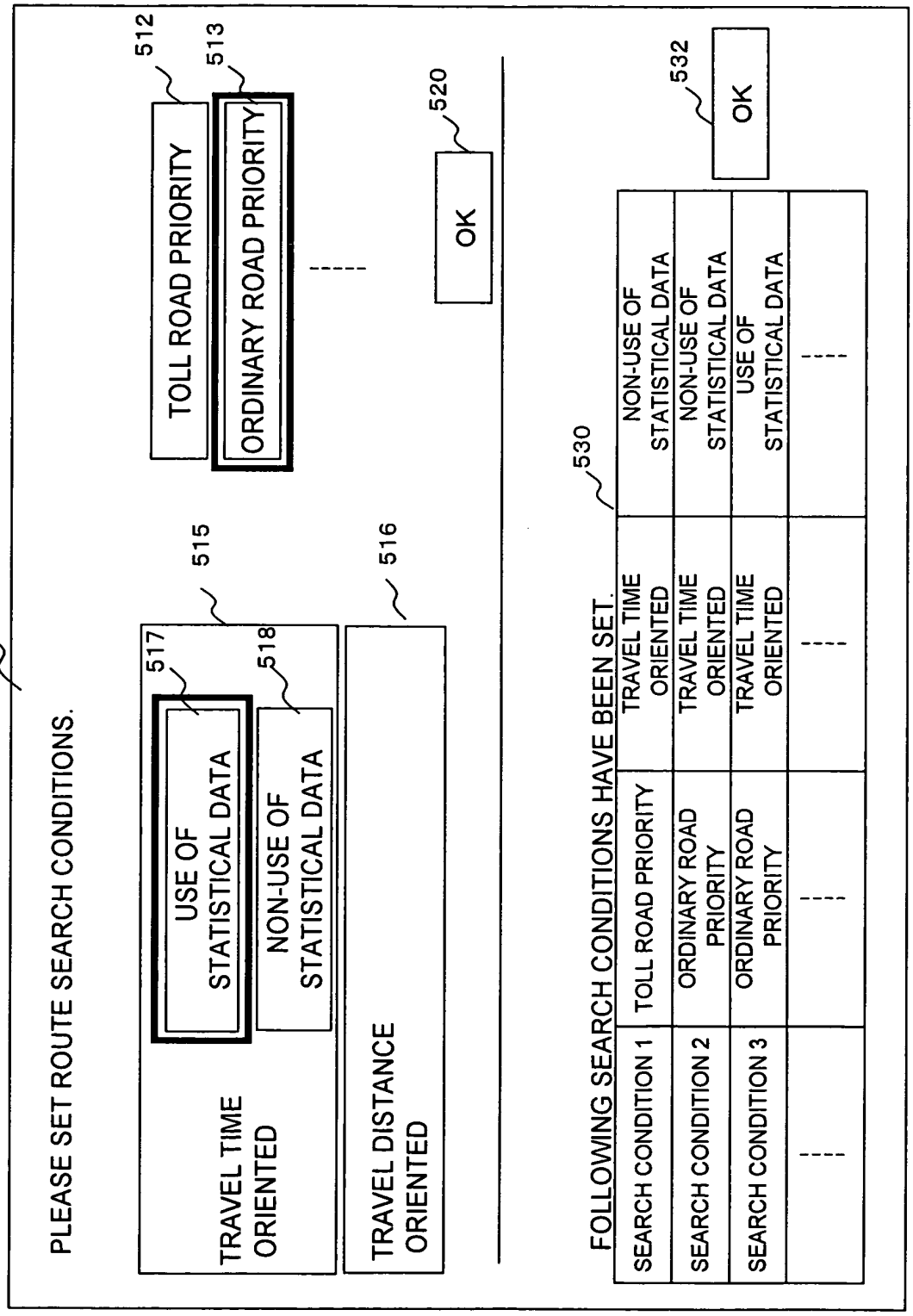
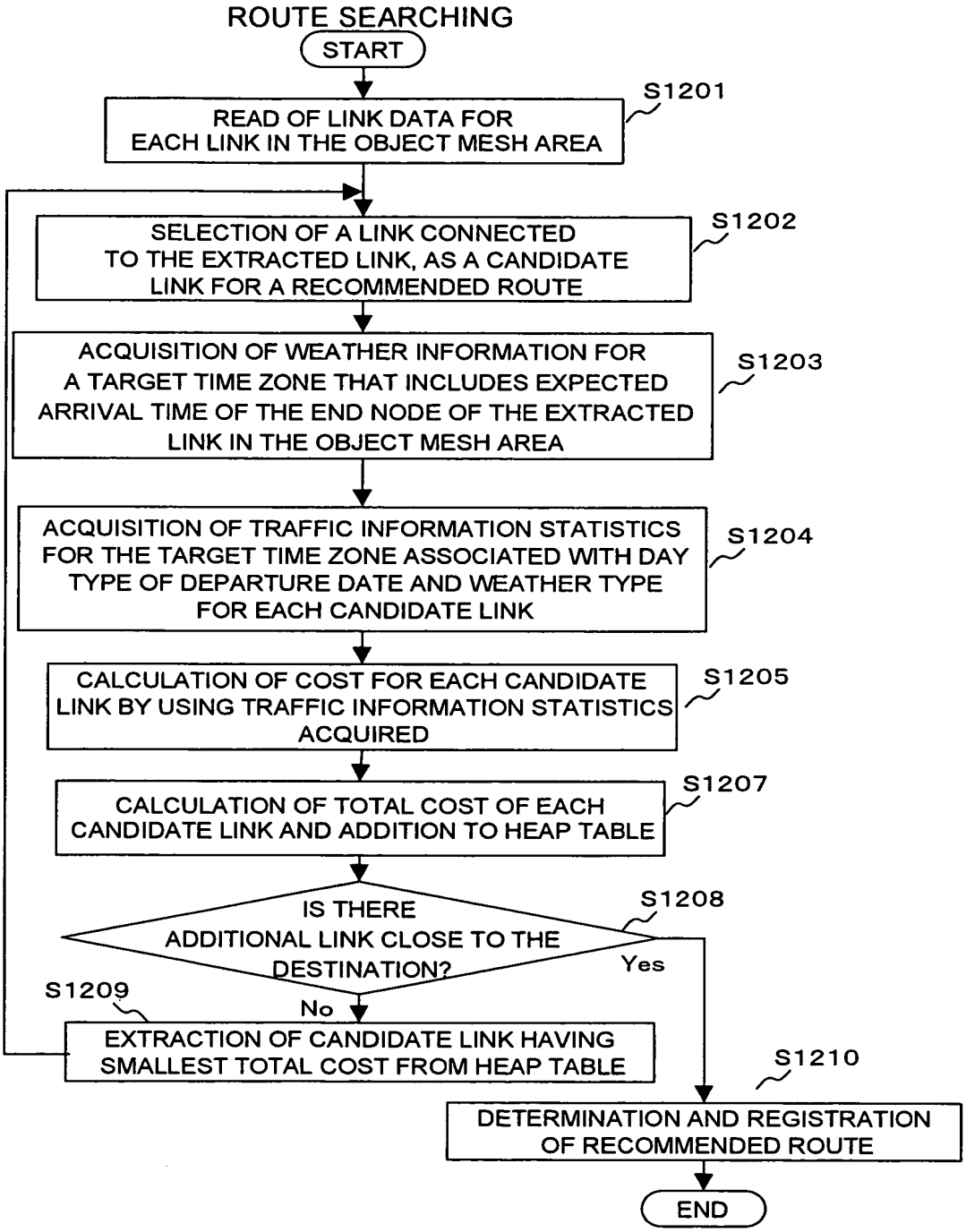

START
S100
SETTING OF DEPARTURE POINT AND DESTINATION
S110
SETTING OF ROUTE SEARCH CONDITIONS
S120
SEARCH FOR A PLURALITY OF ROUTES
S130
CALCULATION OF EXPECTED TRAVEL TIMES AND EXPECTED ARRIVAL TIMES USING TRAFFIC INFORMATION STATISTICS
S140
DISPLAYING OF RECOMMENDED ROUTES
S150
No
ROUTE SELECTED?
Yes
S160
START OF GUIDANCE
END

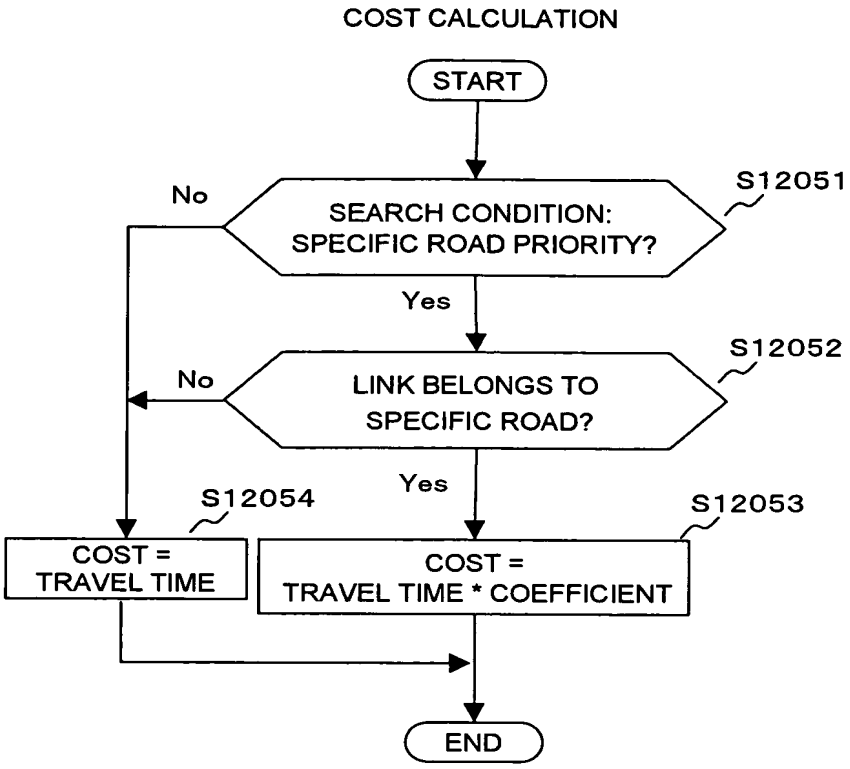
FIG. 8


500
PLEASE SET ROUTE SEARCH CONDITIONS.
TRAVEL TIME ORIENTED
515
517
USE OF STATISTICAL DATA
518
NON-USE OF STATISTICAL DATA
TRAVEL DISTANCE ORIENTED
516
512
TOLL ROAD PRIORITY
513
ORDINARY ROAD PRIORITY
520
OK
FOLLOWING SEARCH CONDITIONS HAVE BEEN SET.
530
SEARCH CONDITION 1
TOLL ROAD PRIORITY
TRAVEL TIME ORIENTED
NON-USE OF STATISTICAL DATA
SEARCH CONDITION 2
ORDINARY ROAD PRIORITY
TRAVEL TIME ORIENTED
NON-USE OF STATISTICAL DATA
SEARCH CONDITION 3
ORDINARY ROAD PRIORITY
TRAVEL TIME ORIENTED
USE OF STATISTICAL DATA
532
OK

# FIG. 9


ROUTE SEARCHING
START
READ OF LINK DATA FOR EACH LINK IN THE OBJECT MESH AREA
S1201
SELECTION OF A LINK CONNECTED TO THE EXTRACTED LINK, AS A CANDIDATE LINK FOR A RECOMMENDED ROUTE
S1202
ACQUISITION OF WEATHER INFORMATION FOR A TARGET TIME ZONE THAT INCLUDES EXPECTED ARRIVAL TIME OF THE END NODE OF THE EXTRACTED LINK IN THE OBJECT MESH AREA
S1203
ACQUISITION OF TRAFFIC INFORMATION STATISTICS FOR THE TARGET TIME ZONE ASSOCIATED WITH DAY TYPE OF DEPARTURE DATE AND WEATHER TYPE FOR EACH CANDIDATE LINK
S1204
CALCULATION OF COST FOR EACH CANDIDATE LINK BY USING TRAFFIC INFORMATION STATISTICS ACQUIRED
S1205
CALCULATION OF TOTAL COST OF EACH CANDIDATE LINK AND ADDITION TO HEAP TABLE
S1207
IS THERE ADDITIONAL LINK CLOSE TO THE DESTINATION?
S1208
Yes
No
S1209
EXTRACTION OF CANDIDATE LINK HAVING SMALLEST TOTAL COST FROM HEAP TABLE
S1210
DETERMINATION AND REGISTRATION OF RECOMMENDED ROUTE
END

# FIG. 10


COST CALCULATION
START
S12051
SEARCH CONDITION:
SPECIFIC ROAD PRIORITY?
No
Yes
S12052
LINK BELONGS TO
SPECIFIC ROAD?
No
Yes
S12054
COST =
TRAVEL TIME
S12053
COST =
TRAVEL TIME * COEFFICIENT
END

# FIG. 11

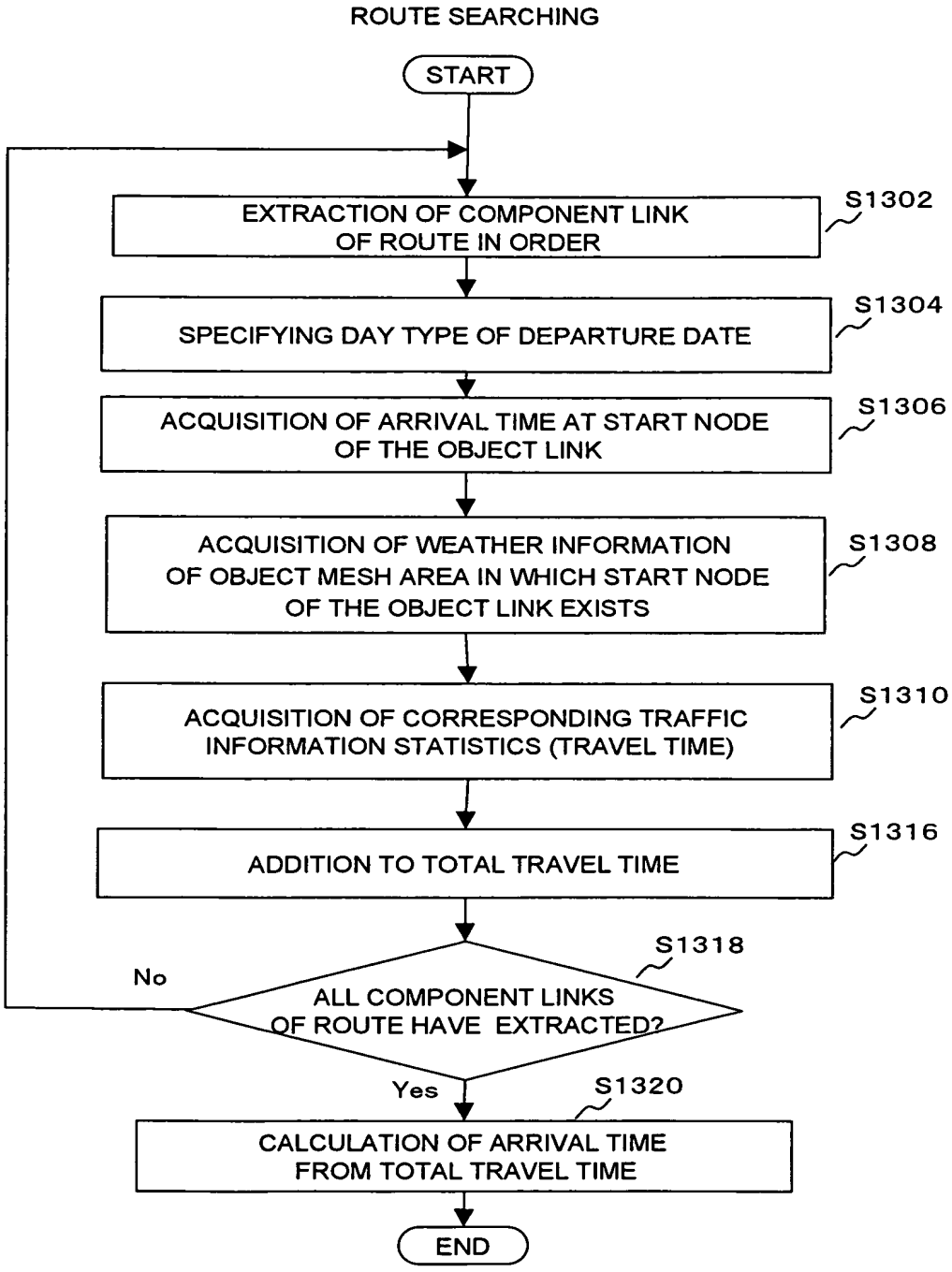
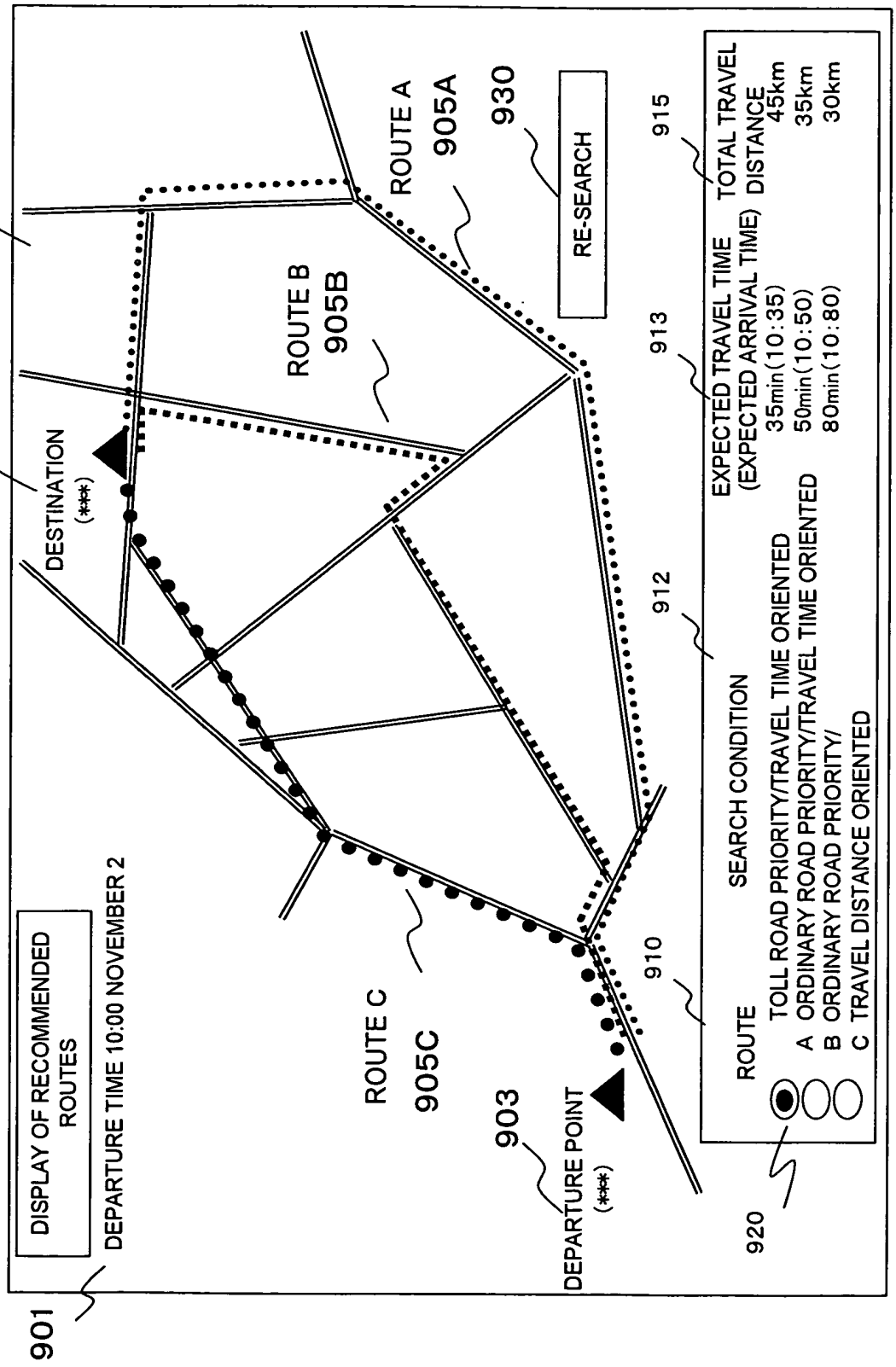

ROUTE SEARCHING
START
EXTRACTION OF COMPONENT LINK OF ROUTE IN ORDER
S1302
SPECIFYING DAY TYPE OF DEPARTURE DATE
S1304
ACQUISITION OF ARRIVAL TIME AT START NODE OF THE OBJECT LINK
S1306
ACQUISITION OF WEATHER INFORMATION OF OBJECT MESH AREA IN WHICH START NODE OF THE OBJECT LINK EXISTS
S1308
ACQUISITION OF CORRESPONDING TRAFFIC INFORMATION STATISTICS (TRAVEL TIME)
S1310
ADDITION TO TOTAL TRAVEL TIME
S1316
S1318
No
ALL COMPONENT LINKS OF ROUTE HAVE EXTRACTED?
Yes
S1320
CALCULATION OF ARRIVAL TIME FROM TOTAL TRAVEL TIME
END

FIG. 12


901
DISPLAY OF RECOMMENDED ROUTES
DEPARTURE TIME 10:00 NOVEMBER 2
909
904
DESTINATION (***)
ROUTE A 905A
ROUTE B 905B
ROUTE C 905C
930
RE-SEARCH
915
913
912
910
903
DEPARTURE POINT (***)
SEARCH CONDITION
EXPECTED TRAVEL TIME (EXPECTED ARRIVAL TIME)
TOTAL TRAVEL DISTANCE
ROUTE
TOLL ROAD PRIORITY/TRAVEL TIME ORIENTED 35min(10:35) 45km
A ORDINARY ROAD PRIORITY/TRAVEL TIME ORIENTED 50min(10:50) 35km
B ORDINARY ROAD PRIORITY/ 80min(10:80) 30km
C TRAVEL DISTANCE ORIENTED
920